THE VALUE OF TREPHINING AS A PALLIATIVE MEASURE IN TUMORS OF THE BRAIN.*

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Sir Victor Horsley, in his address on Surgery, at the meeting of the British Medical Association in Toronto in August, 1906, drew attention to the importance of trephining for the relief of certain symptoms due to intracranial disease and, as my experience with a small number of cases of this kind would fully bear out the opinions expressed by him, I take this opportunity of further emphasizing this subject.

The classical symptoms of tumor of the brain are: Optic neuritis (which usually ends in total blindness); severe headache; and vomiting,—all of which symptoms, being dependent on pressure, can be relieved or entirely removed by a free opening in the skull and dura mater. The most serious symptom of all is, of course, optic neuritis on account of its resulting in blindness: and if there is any means of averting this dreadful calamity it is our duty to employ it. The most important factor in the production of optic neuritis is increase of intracranial tension, and consequently Horsley found that the optic neuritis rapidly subsided after opening the skull and the dura mater. He says that in no case of optic neuritis (excepting those of toxæmic or anæmic origin) should the process be allowed to continue after it has once been diagnosed, and if blindness results therefrom, the responsibility is very heavy upon any one who fails to advise an opening of the dura. It is desirable that the gravity of this responsibility should be generally recognized.

It is usually necessary to make a free opening in the dura

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mater as well as to remove a portion of bone. As to the prediction of the improvement of vision after such procedure everything will depend on the condition of the dises. Yellowish white patches of exudate or white atrophic changes, especially when associated with macular figures, all indicate that the secondary changes in the dises will be permanent. In proportion to this development will the vision be impaired, whereas when the loss of vision has been dependent on the swelling of the dises, then not only is the sight saved but largely improved. In other words, one might say that where the neuritis had not passed on to atrophy the sight would be saved. Horsley states that the optic neuritis commences on the side of the lesion, so that one should be able to judge the side of the lesion by observing which of the nerves is first affected, or, if both are affected, the one which seems to be suffering the greatest changes. The old procedure of de Weeker, of incising the swollen sheath of the optic nerve in the orbit, is of no avail, but Horsley states emphatically that we can with certainty avert blindness by opening the subdural space early, in cases of intracranial disease.

I shall now give the history of some patients with brain tumors upon whom I have recently operated.

Case I.—Mr. H. C.; age sixty; patient of Dr. Fotheringham. Admitted to the General Hospital September 25, 1906. Complaint: Stupor and muscular weakness of the legs. About two years ago he began to show weakness of the legs and unsteadiness at times. He had a staggering gait to one side—not sure now to which side. Gradually he became bedridden; he was very weak, the legs were paralyzed and his intellect became dull. His condition gradually grew worse until now he is in more or less of a stupor, though he can be roused. His arms are also weak.

Present Condition.—Legs not completely paralyzed; he can move them a very little. Considerable spasticity of legs and arms. No vomiting. Pupils somewhat dilated but equal; double optic neuritis present.

Patient was also seen by Dr. Howland. Diagnosis: Tumor of the brain, thought to be in the right Rolandic area.

October 2.—A piece of the skull over the middle of the right motor area about 3 inches square was removed. The dura was not opened, as it was intended to do the operation in two stages. Patient recovered nicely, and on October 9 the second stage of the operation was proceeded with. The dura was then opened and an exploration made, but no tumor found. There was considerable œdema of the brain substance.

October 12.—Patient gradually became comatose after the operation and died this evening. An autopsy was done and a growth the size of an egg was found in the left lobe of the cerebellum, lying immediately under the pia mater, uncovered by brain substance. On section it was found to be gliosarcoma. The mistake in locating the position of the tumor was probably due to not taking into account the early symptoms, which all pointed to cerebellar tumor. If this case had been diagnosed and operated upon earlier there would have been a good chance of recovery.

CASE II.—Dr. W. T. C.; age forty-eight. Admitted to the Toronto General Hospital August 15, 1906, under the care of Dr. Campbell Meyers. The patient was born in Oxford County and practised medicine in Detroit, Mich., until six weeks ago. Four years ago he felt overworked and gave up practice for a few months. He has been fairly well since, but has felt tired and not up to par. He is a light smoker and uses alcohol sparingly. He has been using a motor car recently but has not felt equal to driving it at night. Never had syphilis or gonorrhœa. He complains of diplopia, pain over the left eye and a feeling of exhaustion. There is no history of nervous disease in the family. About six weeks ago he felt more tired than usual and the pain commenced in his head. He had been treated for unequal pupils. As the pain in his head continued and he felt weak, he went to Cobalt to see some friends and for the change, but the pain in his head became worse—so severe that he could not sleep. He came to Toronto and Dr. Ryerson examined his eyes but could find no cause for the diplopia. Discs were normal.

Present Condition.—He has lost weight lately and looks to be sixty. He is very restless, especially at night, tossing about and moaning and talking. He lies with both eyes shut, but when talking or walking he opens the right eye though never the left unless asked to do so, then very slowly. He is hard to rouse and requires a good deal of shaking to get him up. He walks uncertainly

unless guided, sometimes with the right eye open and sometimes with both closed. It is very hard to get him to talk and he answers questions slowly and in monosyllables and seldom gives a direct answer. He wanders a great deal and apparently cannot concentrate his mind to answer questions put to him. Cerebration is slow. He takes no interest in things going on around him. The pain, he complains, is very intense, being behind and above the left eye; it is worse at night and he has been unable to sleep for nights without morphia. The left pupil is a little dilated and a little larger than the right; both react to light and accommodation for distance. Sight is fairly good in the left eye but not as good as in the right.

On August 24 he was examined by Dr. Putnam of Boston. On this date his superficial reflexes on the left side were abolished, his left Babinski was dorsal, his right plantar, the left knee jerk absent, right slightly exaggerated. All the deep reflexes on the left side were abolished; the left pupil more dilated but reacted slightly to light. He has very little power in his left leg and no power in the left arm. Pulse weak and irregular.

August 25.—Patient dull; at times cannot be roused; has Cheyne-Stokes breathing. Pulse, high tension and irregular. Examination with the ophthalmoscope shows marked swelling of the left disc. Knee jerk, right—absent. Babinski, right—absent. Knee jerk, left—present but slight. Babinski, left—present. No ankle clonus on either side. He has no power in his right arm; twitching at times in the right hand and forearm. Breathing stertorous.

August 27.—Passing fæces and urine involuntarily. Double optic neuritis is present, more marked on the left side; vessels greatly engorged. He was now quite unconscious. He was seen by Drs. Meyers, Seofield and myself and a diagnosis of tumor of the brain made and operation decided upon. This was accordingly proceeded with, the same afternoon at three o'clock. An opening was made over the right Rolandic area with an inch trephine; this was enlarged by saw-cuts, one above and one on either side of the trephine opening, and the intervening bone was removed piecemeal with rongeur forceps, making the opening 2½ inches square. The dura mater was very tense, and, on incising it, a large hernia cerebri immediately formed. Constant irrigation with normal saline (at a temperature in the irrigator

of 110° F.) was kept up during the operation. The pia mater was deeply injected, and the arteries showed plaques of calcareous material. The bleeding points in the pia mater were ligatured with catgut. The scalp was then closed and a dry dressing applied. His pulse remained weak after the operation, and at 10 P.M. he developed marked Cheyne-Stokes breathing and died at 5 A.M. from respiratory failure.

Dr. A. L. Graham did an autopsy and found, on opening the right lateral ventricle by a longitudinal section, a tumor about 5 cm. in diameter, situated posterior to the anterior part of the optic thalamus and in the crus cerebri. The cerebral vessels were congested and hard, the vessels at the base showing evidences of patchy sclerosis. Microscopic section shows it to be a spindle-celled sarcoma.

CASE III.—Mrs. M. F. R.; age forty; patient of Dr. H. J. Hamilton, with whom I saw her in consultation October 14, 1906, when she was suffering excruciating pain in the head, mostly over the right eye. She was in a highly excited and nervous condition, almost maniacal, with a suicidal tendency. There was external strabismus, ptosis and proptosis of the right eye and vomiting. No weakness of the muscles anywhere. Her chief trouble was violent pain in her head of a bursting character, which prevented her from sleeping and which she claimed was driving her crazy. She was very despondent and constantly asked for something to put her out of misery. The present trouble commenced in 1904, was worse in 1905, and has been increasing in severity ever since. She has had some twitching of the right side of her face.

Previous Illnesses.—She had tubercular disease of the skin of her wrist and above the knee, which healed; also had Pott's disease of the spine, which was cured after wearing a jacket.

Present Condition.—She now has pain in the back of her head as well as over the right eye; she is in a highly nervous condition and is fearful of everything. Pulse weak and rapid. Right pupil dilated; has diplopia with right ptosis. Dr. Colin Campbell examined her eyes and reported as follows: The *right eye* shows paralysis of the third nerve. She can only half open the lid; pupil all but fully dilated and inactive. The optic disc margin and vessels and retina near by are buried in a mass of watery exudate about 5 dioptres high; vessels rather small—

no hæmorrhages. Macula and periphery free of gross changes. *Left eye.*—Muscles normal; active choked disc 3 dioptres high, with small hæmorrhages on it and flakes of white exudate. Veins very full; macula and periphery normal; pupil small and inactive. Nothing would relieve the pain in her head but morphia, and this only slightly when a grain was given hypodermically.

Diagnosis.—Intracranial pressure from one of the following conditions: meningitis with thickening, tubercular or syphilitic tumor. It was decided to trephine in the right frontal region to relieve the pressure. This was done on October 17, 1906.

As soon as the bone was removed the dura bulged into the opening; the dura was incised and a large hernia cerebri developed. The anterior part of the base of the frontal lobe could be seen but there was no evident indication of the nature of the trouble. Some exploration was made of the frontal lobe but nothing discovered. The dura was left open and the skin flap closed except for a small opening for gauze drainage. The wound healed nicely except where left open for drainage, and here there was a considerable discharge of cerebrospinal fluid. She had almost immediate relief from the headache and vomiting. When the opening was allowed to close she had return of the headache and on opening it with a probe and giving vent to the cerebrospinal fluid the headache was immediately relieved. On one occasion when it had closed the House Surgeon was called up at 4 o'clock in the morning, and, finding the small opening closed, opened it with a probe and let out about two ounces of cerebral spinal fluid. The patient had immediate relief and went to sleep.

November 16.—Sees no better. Right ptosis almost nil and pupils semi-dilated; reaction very slight. The right optic disc merely obstructed by exudate. No hæmorrhage and almost no swelling. *Left eye.*—The outer margin of the disc clear; inner margin hidden by piabolic exudate. The disc looks pale but indistinct.

November 27.—Patient was taken home to-day in good condition. Pulse 100, temperature normal. Headaches entirely relieved and is able to take a large mount of nourishment and has no nausea or vomiting. She has required nothing for her pain since the operation. Her general nervous condition is markedly improved; the nervous, excited condition has entirely disappeared. She sleeps from seven to eight hours at night. Since going home

she eats her meals at the table with the family. The ptosis and diplopia have disappeared.

CASE IV.—Miss McC.; age thirty-five; patient of Dr. R. J. Wilson, with whom I saw her on November 10, 1906. She complained of intense pain in her head, most marked over the left occipital region. She taught in a kindergarten school until June last. Had the diseases of childhood and had diphtheria when a child and typhoid since. When she was eight years old she received an injury from the crank of a grinding stone in the left occipital region, which left a small indentation at that spot. In April of this year patient had a sense of dizziness and would lose sight for a moment or two. On one occasion she fell in the street and another time fell down the steps of her boarding house, but without injury, being able to get up immediately and go about as usual. She had the feeling in her head as if she would fall and was constantly holding her hand up to guide herself about the room. She continued to teach in school until June 27, 1906. At this time the pain in her head became so severe that it seemed unbearable. She has lost her sight within the last four weeks, but up to that time she was able to read.

Her condition on entering the hospital on November 12 was as follows: Is very talkative, fairly well nourished, pupils widely dilated. She can distinguish daylight from darkness and she can tell when a hand is passed before her. She has weakness of the external recti; there is some weakness also of the left superior rectus, and internal strabismus of the left eye. The pupils do not react to light or accommodation. She is not able to wrinkle the left side of her forehead or wink the left eye; her tongue is protruded to the left side and when she attempts to blow or whistle the left side of the mouth droops. She has had weakness of the left side of her face for some months. In eating, food would accumulate in the left cheek. The grip of the left hand is weaker than that of the right. She has had considerable vomiting, independent of food. The right knee reflex is exaggerated—left normal. There is loss of the sense of smell in the left nostril and loss of hearing in the left ear.

Dr. Colin Campbell examined her eyes and reported as follows: Eyes staring; right eye the better of the two; left eye converges; outward movement defective; no obvious facial paralysis: Pupils: *right,* slightly smaller; both react sluggishly, espe-

cially the left. Both pupils larger than normal; right, slightly smaller. Double optic neuritis. In the right eye the swelling of the disc is 4 to 6 dioptres high. Veins moderately distended; vessels near the disc varied in exudate. A few small hæmorrhages only; no macular figures. Rest of fundus normal. *Left eye.*—Swelling of disc only 2 dioptres high. The outer margin of the disc almost visible; macula clear. The margins of the disc show white radiating appearance of exudate. It appears to be subsiding.

She was seen by Dr. Campbell Meyers and Dr. W. P. Caven, and they concurred in the diagnosis of tumor of the cerebellum, probably of the left side.

I operated on November 14, trephining over the left cerebellum. The dura mater bulged into the wound. The trephine opening was enlarged ¼ inch on either side and the dura incised. The cerebellum immediately projected out through the opening in the dura to a distance of ½ inch above the surface of the bone. The cerebellum over an area the size of a twenty-five-cent piece looked injected and infiltrated. On feeling this projecting portion one could make out distinct fluctuation. Cerebellar tissue was separated a little, exposing a grayish membrane, through which a director was passed and from 2 to 3 ounces of clear fluid removed. A pair of artery forceps were passed along the groove of the director and the opening enlarged, when a distinct cyst with thickened walls could be made out. Normal saline at a temperature of 120° was kept constantly running over the wound during the operation. After evacuating the fluid the cyst collapsed and the cerebellum receded, leaving a distinct depression. An opening was left in the dura to allow of a small strip of sterile gauze being inserted for drainage, and the wound closed except where this was brought out.

November 14—Evening.—She has rested fairly well since operation. The pain in her head has almost entirely disappeared.

November 15.—Patient had a good night; pupils slightly active to light but not to accommodation. Patient is able to distinguish dark from light colors and able to count fingers. Dressing done; there was considerable oozing of clear fluid and blood.

November 16.—The pain in her head has entirely disappeared. Had a little soreness between the scapulæ; she is able to recognize odors through the left nasal orifice, oil of wintergreen

being placed on a wipe while the right orifice was closed; hearing in the left ear somewhat improved. Packing removed from wound.

November 17.—Had a good night—no pain or headache is felt and no vomiting. A tube was put in for drainage to replace gauze. Movement of the eyes much improved. Patient complains of hyperæsthesia of left side of face; tongue can now be protruded without deviation to the left; pupils quite active and sight much better. She can recognize the faces of those about her.

November 19.—Hyperæsthesia has about disappeared; patient can wink the left eye and wrinkle her forehead; pupils active; great deal of oozing of straw-colored fluid from wound.

November 20.—Wound healed entirely by first intention, except for the small opening left to provide drainage.

November 29.—Patient able to read the headline of a newspaper; able to distinguish house surgeons, nurses and friends. Can distinguish colors.

December 1.—Can see the snow flakes falling against the window. The discharge of clear fluid diminishing.

December 2.—Patient out in a wheel chair; is quite steady—no dizziness; no pain; eyesight steadily improving. She feels perfectly well. Can recognize people entering the door of her ward.

CASE V.—S. F.; age ten; patient of Dr. Eadie. I saw him in consultation with Drs. Eadie and W. P. Caven on November 23, 1906. He was quite well until last March, when he commenced to have what his parents thought to be bilious attacks once a week. These attacks consisted chiefly of bad headaches, and during this time he would not eat. During August and September he was at Jackson's Point. His father consulted Dr. Eadie in the first part of August, and Dr. Eadie first saw the patient October 1, 1906. His attacks were becoming more frequent and more severe and for the last month he had had three attacks in a week. Once a week the attack was a very severe one. The headache complained of was general. The patient said he felt it all over his head. His temperature was taken every morning for some weeks and found to be normal. He has vomited altogether seven or eight times during the attacks. He has lately been having them every second day, waking in the morning with severe headache.

In the middle of October Dr. Duncan examined his eyes and found double optic neuritis. We had Dr. Duncan examine the eyes again on November 26 to see if he could determine which eye was first affected, so that we might have some guide as to the side of the tumor, and he reports that there is no difference in the discs of the two eyes to indicate which one was first affected. The papillitis has not progressed. He has absolutely no localizing symptoms. Examination of the heart, kidneys, lungs, etc., negative. He has been an exceptionally healthy boy since birth, not having the usual children's sicknesses.

Diagnosis.—Increased intracranial pressure, probably due to tumor. We concurred in advising trephining for the relief of pressure, hoping to relieve the headaches and prevent the optic neuritis progressing to blindness. This was agreed to and the operation was accordingly performed November 28, 1906. Dr. McMahon gave chloroform; Dr. Eadie assisted me. As there were no localizing symptoms, trephining was done in the right temporal region, an area of bone 2 inches square being removed. The dura mater was very tense and on opening it a large hernia cerebri immediately formed. The brain was explored in several directions to a depth of a couple of inches but nothing was found. The dura was left open and the scalp closed without drainage and a dressing applied. As soon as the effects of the anæsthetic passed off he was quite comfortable. He has been quite free from pain and vomiting since the operation. The wound was healed by first intention; temperature and pulse are both normal, and he has made a rapid and satisfactory recovery.

These cases would indicate, in the first place, how important it is that they should be submitted to surgical treatment early, and, secondly, what good results can be obtained by the very safe and simple procedure of trephining.